



US006086066A

United States Patent [19]
Takeuchi et al.

[11] **Patent Number:** **6,086,066**
[45] **Date of Patent:** **Jul. 11, 2000**

[54] **REEL APPARATUS FOR GAME MACHINE**

2921159 A1 12/1980 Germany G07F 17/34
3105266 A1 9/1982 Germany G07F 17/34

[75] Inventors: **Susumu Takeuchi; Yukihiro Yuasa,**
both of Minato-ku, Japan

[73] Assignee: **Aruze Corporation,** Tokyo, Japan

Primary Examiner—Benjamin H. Layno
Attorney, Agent, or Firm—Snider & Chao LLP; Ronald R. Snider

[21] Appl. No.: **09/076,715**

[22] Filed: **May 13, 1998**

[57] **ABSTRACT**

[30] **Foreign Application Priority Data**

Jun. 23, 1997 [JP] Japan 9-181805

[51] **Int. Cl.⁷** **G07F 17/34**

[52] **U.S. Cl.** **273/143 R; 273/138.2;**
463/20

[58] **Field of Search** **273/143 R, 138.2;**
463/20

Disposed in front of the lastly stopping center reel **12B** of three reels **12A, 12B,** and **12C** is a cover member **16** which is movable between the position of a display apparatus **108a** and a shelter position thereabove and is formed with a picture **Fo**. When the reel **12B** is stopped with its picture **Fo** placed at the display window **108a**, in the case where each of the other two reels **12A** and **12C** is stopped with the picture **Fo** placed at the display window **108a** (in the case of a jackpot), the cover member **16** is moved from the shelter position to the position of the display window **108a** and minutely vibrates at the position of the display window **108a** before being stopped, whereby the picture **Fo'** formed in the cover member **16** appears in an unusual mode. Accordingly, the player's impression when winning a jackpot in a game machine equipped with thus configured reel apparatus can be fully enhanced, thus allowing enjoyability thereof to improve.

[56] **References Cited**

U.S. PATENT DOCUMENTS

5,152,529 10/1992 Okada 273/143 R
5,395,111 3/1995 Inoue 273/143 R
5,449,173 9/1995 Thomas .
5,752,881 5/1998 Inoue 273/143 R

FOREIGN PATENT DOCUMENTS

0484103 A2 5/1992 European Pat. Off. G07F 17/34

5 Claims, 4 Drawing Sheets

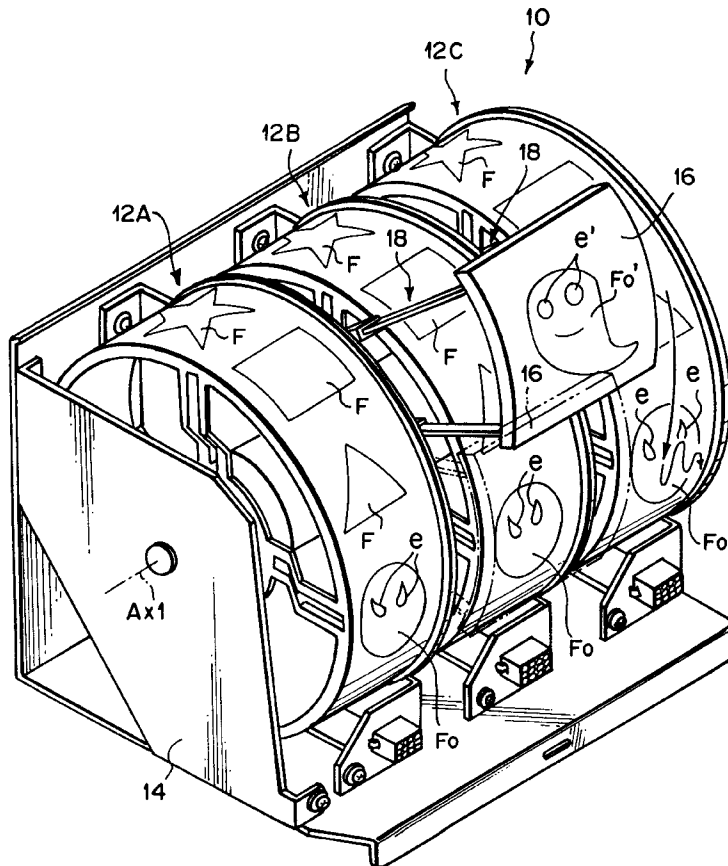


FIG. 1

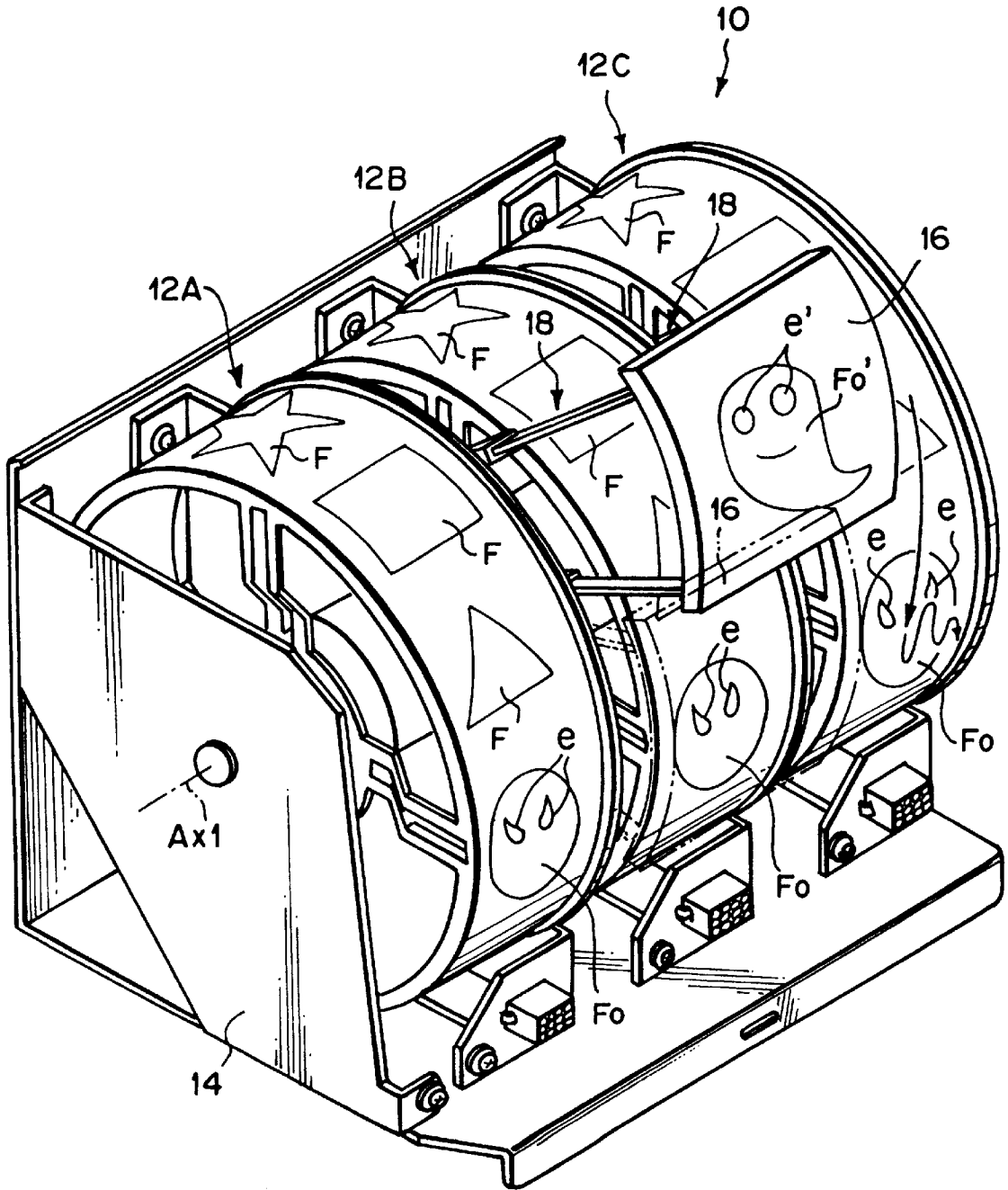


FIG. 2

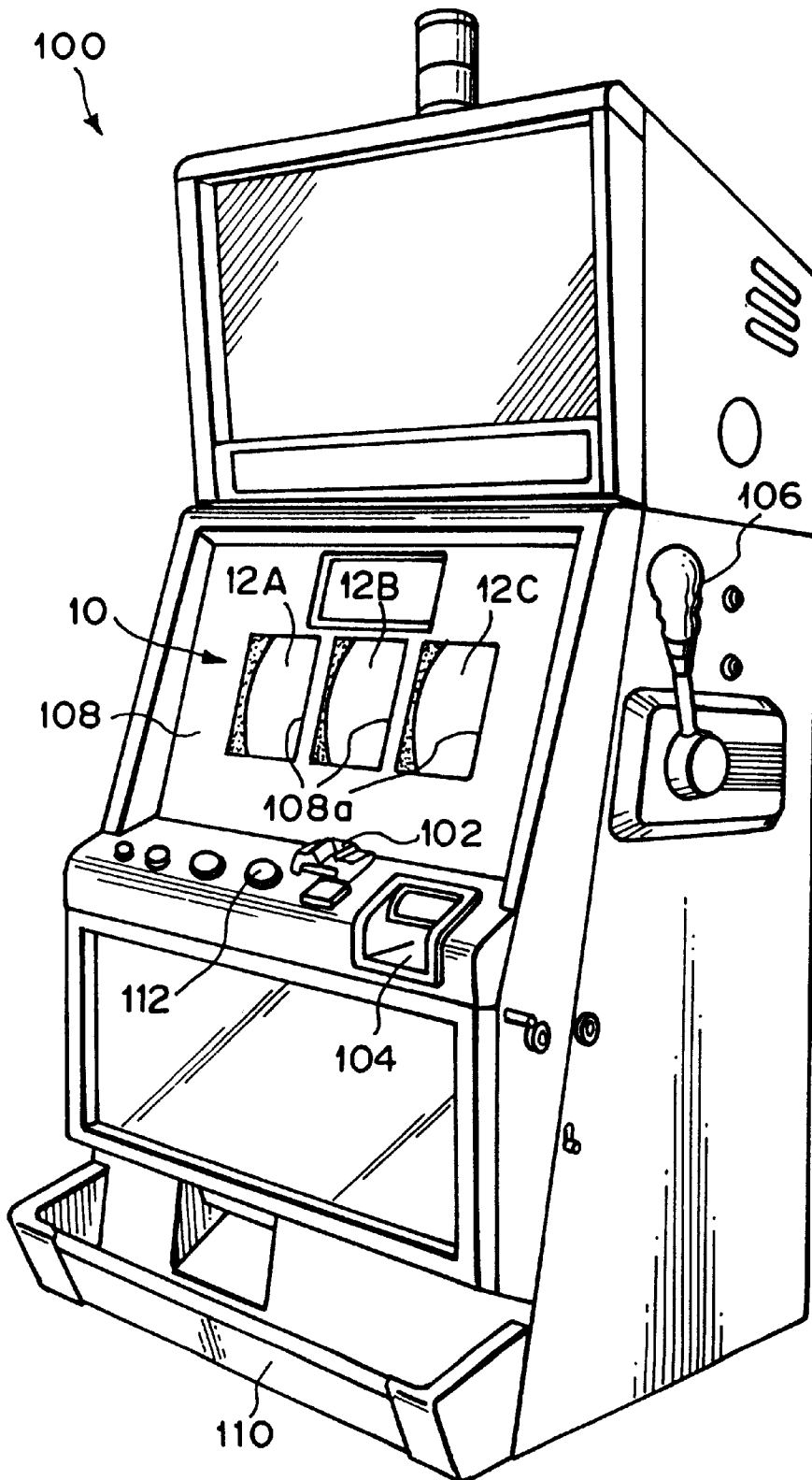


FIG. 3

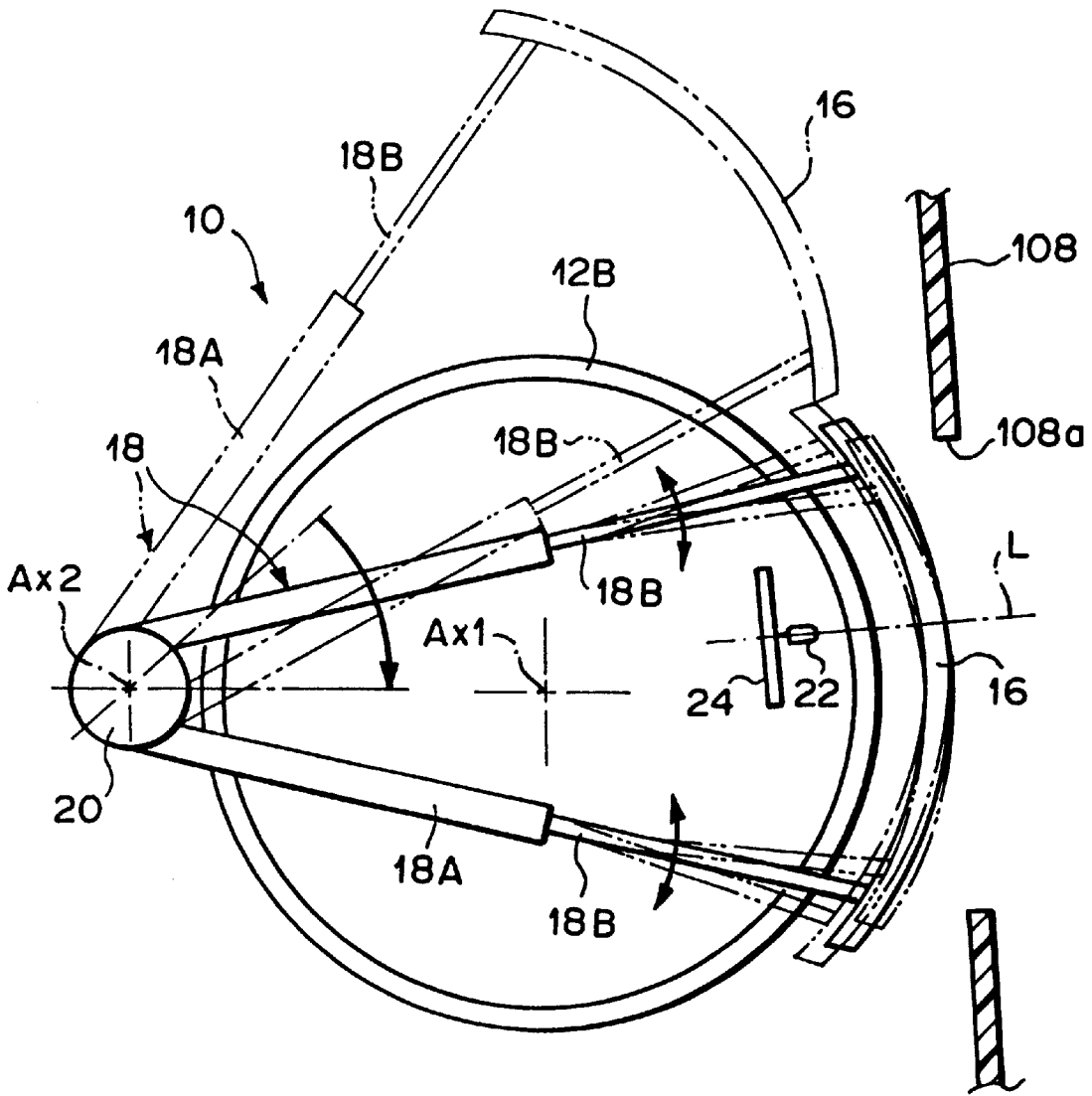


FIG. 4

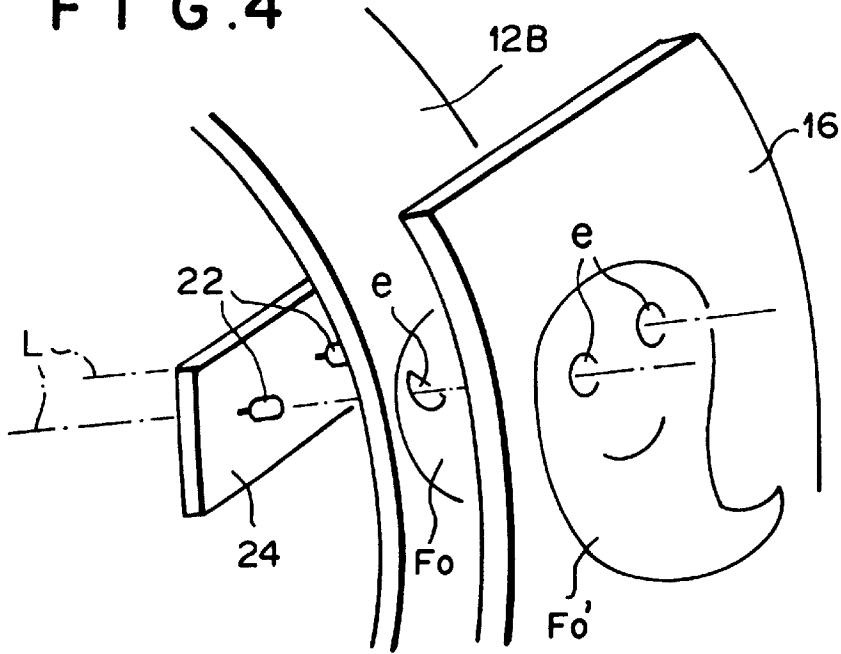
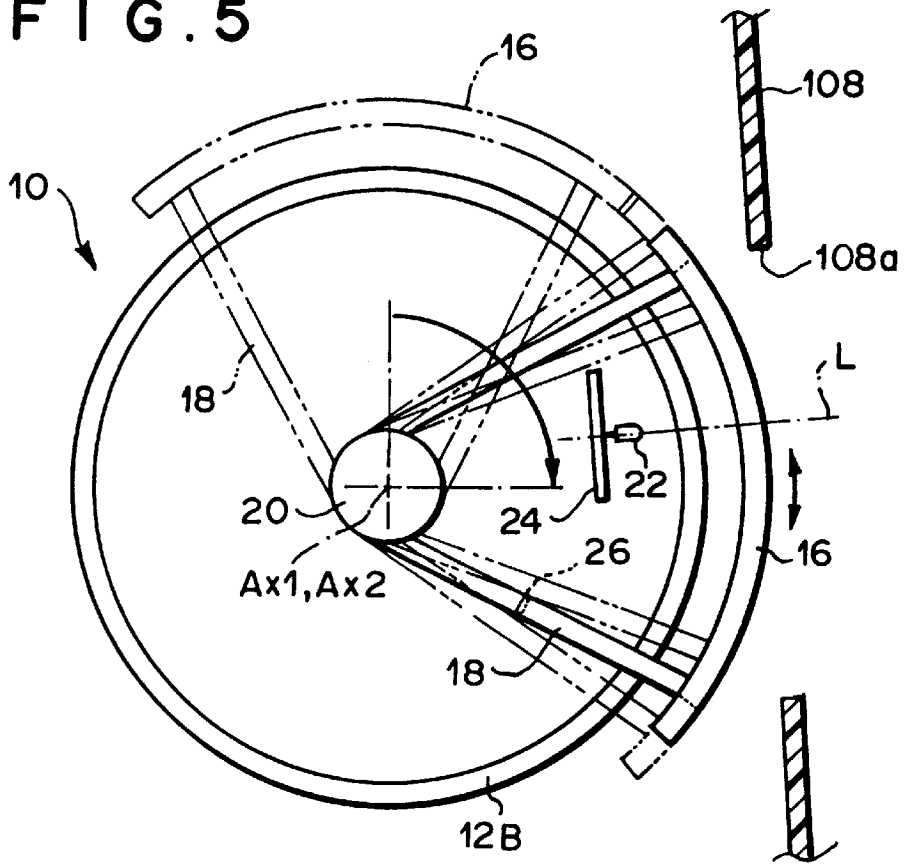


FIG. 5



REEL APPARATUS FOR GAME MACHINE

RELATED APPLICATIONS

This application claims the priority of Japanese Patent Application No. 9-181805 filed on Jun. 23, 1997, which is incorporated herein by reference.

BACKGROUND OF THE INVENTION

1. Field of the Invention

The present invention relates to a reel apparatus installed in a game machine such as a slot machine. The present invention can widely be used for improving enjoyability of various kinds of amusement machines.

2. Description of the Prior Art

In a slot machine (reel rotation automatic stop type), a slot section of a pachinko (Japanese upright pinball) machine, or the like, there is provided a reel apparatus which has a plurality of reels and automatically stops rotation of each reel after a predetermined lapse of time from the start of rotation. In general, this reel apparatus has the following configuration.

Namely, the plurality of reels are adapted to rotate independently from each other around a single axis, whereas a plurality of pictures are formed in series on the peripheral surface of each reel along its circumferential direction. Upon a starting operation by a player or the like, these reels simultaneously start rotating. Thereafter, the reels automatically stop in sequence, each placing one of the plurality of pictures at a display window in front of the reel.

In such a so-called automatic stop type reel apparatus, however, a prize would be won only when a combination of pictures appearing in the display windows in front of the reels coincides with a specific picture pattern. Accordingly, the player winning a prize may not always be impressed sufficiently, thus lacking enjoyability.

SUMMARY OF THE INVENTION

In view of such circumstances, it is an object of the present invention to provide a reel apparatus for a game machine, which can sufficiently enhance the player's impression when winning a prize, thereby enhancing enjoyability.

In the reel apparatus for a game machine in accordance with the present invention, in order to enhance the impression of winning a prize, a cover member formed with a predetermined picture is turned up in an unusual mode when the lastly stopping reel is stopped so as to yield a prize winning state, thereby achieving the above-mentioned object.

Namely, the present invention provides a reel apparatus for a game machine, comprising a plurality of reels which rotate around a single axis, each having a plurality of pictures formed in series on a peripheral surface thereof along a circumferential direction thereof, the reels being rotated independently from each other and automatically stopped in sequence while each placing one of the plurality of pictures at a preset angle position;

wherein a cover member formed with a predetermined picture and movable between the preset angle position and a shelter position other than the preset angle position is disposed in front of a lastly stopping reel of the plurality of reels; and

wherein, when the lastly stopping reel is stopped so as to place a predetermined picture at the preset angle

position, in the case where another reel is stopped so that a specific picture is placed at the preset angle position in combination with the predetermined picture, the cover member moves from the shelter position to the preset angle position and minutely vibrates at the preset angle position before being stopped.

The "predetermined picture" formed in the cover member may be the same as or different from the "predetermined picture" formed in each of the reels.

As long as the "cover member" is movable between the preset angle position and the shelter position, its mode of movement is not restricted in particular, i.e., it may be either linear movement or pivotal movement.

BRIEF DESCRIPTION OF THE DRAWINGS

FIG. 1 is a perspective view showing a reel apparatus for a game machine in accordance with a first embodiment of the present invention;

FIG. 2 is a perspective view showing a slot machine (game machine) in which the above-mentioned reel apparatus is incorporated;

FIG. 3 is a side view showing a main part of the above-mentioned reel apparatus;

FIG. 4 is a perspective view showing a main part of FIG. 3; and

FIG. 5 is a side view showing a main part of a reel apparatus for a game machine in accordance with a second embodiment of the present invention.

DESCRIPTION OF THE PREFERRED EMBODIMENTS

In the following, embodiments of the present invention will be explained with reference to the accompanying drawings. To begin with, a first embodiment of the present invention will be explained.

FIG. 1 is a perspective view showing a reel apparatus of a game machine in accordance with this embodiment; whereas FIG. 2 is a perspective view showing a slot machine (game machine) in which this reel apparatus is incorporated.

As shown in FIG. 1, this reel apparatus 10 comprises three reels 12A, 12B, and 12C. The three reels 12A, 12B, and 12C are supported by a reel supporting bracket 14 so as to be rotatable independently from each other. Their axis of rotation Ax1 is set on a single axis. On the peripheral surface of each of the reels 12A, 12B, and 12C, a plurality of pictures F are formed in series along its circumferential direction.

As shown in FIG. 2, the above-mentioned slot machine 100 is a reel automatic stop type slot machine. When a handle lever 106 is pushed down on the front side (or a spin button 112 is pushed) while cash is inserted in a coin entry 102 or a bill entry 104, the reel apparatus 10 is actuated, so that the three reels 12A, 12B, and 12C start rotating at the same time. Thereafter, the left-side reel 12A, the right-side reel 12C, and the center reel 12B, in this order, automatically stop rotating.

Here, the reels 12A, 12B, and 12C stop rotating while each of which places one of the plurality of pictures F at its corresponding one of three display windows 108a formed in a reel glass plate 108.

In the case where the combination of pictures F shown in the three display windows 108a when the reels 12A, 12B, and 12C are stopped coincides with a predetermined prize winning pattern, the number of coins corresponding to the prize winning pattern flows out into a coin tray 110.

In each of the reels 12A, 12B, and 12C, the part formed with each picture F is constituted by a semitransparent

member having a diffuse transmission characteristic. The picture F positioned at the display window **108a** is brightly illuminated from its rear side with an illuminating means (not depicted) disposed within a space on the inner periphery side of each of the reels **12A**, **12B**, and **12C**. Among the plurality of pictures F, the one indicated by Fo has a pair of slanted eyes e, each of which is constituted by a transparent member having a straight transmission characteristic (or through-hole).

In the case where the reels **12A**, **12B**, and **12C** are stopped so that the picture Fo is shown in each of the three display windows **108a** (in the state shown in FIG. 1), as a jackpot winning pattern, a large amount of coins flow out into the coin tray **110**.

A player winning such a jackpot is impressed thereby. Here, it is preferable to produce a certain effect for enhancing the player's impression, in addition to simply causing a larger amount of coins to flow out into the coin tray **110**.

From such a viewpoint, this embodiment is provided with a jackpot effecting structure as follows.

The instant at which the player gets an impression of a jackpot is when, of the three reels **12A**, **12B**, and **12C**, the lastly stopping center reel **12B** is stopped such that its picture Fo is placed at the display window **108a**. Therefore, in this embodiment, at this instant, a hobgoblin picture Fo' shown in FIG. 1 appears in the display window **108a** in front of the center reel **12B** from thereabove, and is minutely vibrated before being stopped.

The picture Fo' is formed in the cover member **16**. In the cover member **16**, the part corresponding to the picture Fo' is constituted by a semitransparent member having a diffuse transmission characteristic, whereas the part corresponding to each of a pair of round eyes e' in this picture Fo' is constituted by a transparent member having a straight transmission characteristic (or through-hole). The pair of eyes e' are formed with the same lateral pitches as those of the pair of eyes e in the picture Fo of the reel **12B**, so as to be positioned at substantially the same level as the pair of eyes e when the picture Fo' is stopped at the display window **108a**.

The cover member **16** is constituted by a substantially rectangular plate-like member having an arc-shaped side cross section, and is configured such that it can be placed, in front of the center reel **12B**, at the position of the display window **108a** (preset angle position) and a shelter position thereabove. In order to realize this configuration, the cover member **16** is secured to a tip portion of each of a pair of pivotal levers **18** on the right and left end sides thereof.

As shown in FIG. 3, the base end portion of each pivotal lever **18** is connected to a motor **20** which is secured to the reel supporting bracket **14** in the vicinity of the center reel **12B** on its rear side. As the rotor **20** is driven, each of the pivotal levers **18** pivots about a pivotal axis Ax2 positioned in the vicinity of the center reel on its rear side, thereby moving the cover member **16**, which is secured to the tip portion thereof, between the position of the display window (position indicated by solid lines) and the shelter position (position indicated by chain double-dashed line).

In each of the pivotal levers **18**, its base end portion is constituted by a V-shaped resin member **18A**, while its tip portion is made of a pair of upper and lower stainless steel members **18B**. The resin member **18A** has a rectangular cross section, whereas each stainless steel member **18B** is formed like a plate. These members are integrally formed by insert molding. In each pivotal lever **18**, with respect to the load about the pivotal axis Ax2, the resin member **18A**

functions as a rigid body, whereas the stainless steel member **18B** functions as an elastic body. Consequently, when each pivotal lever **18** is pivoted about the pivotal axis Ax2 so as to move the cover member **16** from the shelter position **16** to the position of the display window **108a** and is stopped at the latter position, the stainless steel member **18B** is elastically deformed due to an inertial force, whereby the cover member **16** minutely vibrates as indicated by chain double-dashed lines. As this minute vibration gradually attenuates, the cover member **16** stops at the position indicated by solid lines.

In FIG. 3, in the vicinity of the peripheral surface of the center reel **12B** within the space on the inner periphery side thereof, a pair of right and left LEDs **22** are disposed. As shown in FIG. 4, the pair of LEDs **22** are disposed, with the same lateral pitches as those of the pair of eyes e of the picture Fo and those of the pair of eyes e' of the picture Fo', so as to be respectively positioned on lines L connecting the pair of eyes e and their corresponding pair of the eyes e' when the pictures Fo and Fo' are stopped at the same display window **108a**.

As explained in detail in the foregoing, in the reel apparatus **10** for a game machine in accordance with this embodiment, in front of the lastly stopping center reel **12B** among the three reels **12A**, **12B**, and **12C**, there is disposed the cover member **16**, which is formed with the picture Fo' and movable between the position of the display window **108a** and the shelter position thereabove. When the reel **12B** is stopped such that its picture Fo is placed at the display window **108a**, in the case where each of the other two reels **12A** and **12C** is stopped with the picture Fo placed at its corresponding display window **108a** (i.e., in the case of a jackpot), the cover member **16** moves from its shelter position to the position of the display window **108a**, and minutely vibrates at the position of the display window **108a** before being stopped. Consequently, the picture Fo' formed in the cover member **16** appears in an unusual manner, so as to sufficiently enhance the player's impression when winning a jackpot, thus allowing enjoyability to improve.

Also, in this embodiment, the cover member **16** is supported by the tip portion of the pivotal lever **18** rotatably disposed about the pivotal axis Ax2, whereas the pivotal lever **18** is pivoted by the motor **20** connected to the base end portion of the pivotal lever **18** so that the cover member **16** can be placed at the position of the display window **108a** and the shelter position. Since the tip portion of the pivotal lever **18** is constituted by the stainless steel member **18B**, and the cover member **16** is caused to minutely vibrate as mentioned above due to the elastic deformation of the stainless steel member **18B**, the above-mentioned effect can be realized by a simple configuration.

Further, in this embodiment, pairs of right and left eyes e and e' are respectively formed in the picture Fo of the reel **12B** and the picture of Fo' of the cover member **16** each as a light-transmitting portion, whereas a pair of LEDs **22** are disposed within the space on the inner periphery side of the reel **12B**. When the reel **12B** is stopped such that the picture Fo is placed at the display window **108a**, while the cover member **16** is stopped at the position of the display window **108a**, each LED **22** and its corresponding eyes e and e' are positioned on the single line L, whereby light beams from the pair of LEDs **22** are transmitted through the pair of eyes e and the pair of eyes e' so as to advance ahead of the reel **12B** upon winning a jackpot. As a result of this effect, the player's impression can be further enhanced.

In this embodiment, when the lastly stopping center reel **12B** is stopped such that the picture Fo is placed at the

display window **108a**, the case where each of the two other reels **12A** and **12C** is stopped with the identical pictures **Fo** placed at the display window **108a**, i.e., the case where all the three pictures are the identical pictures **Fo**, is defined as a jackpot, at which the effect of the cover member **16** is produced. Without being restricted thereto, however, when the lastly stopping center reel **12B** is stopped, the effect of the cover member **16** may be produced also in the case where the other two reels **12A** and **12C** are stopped with specific pictures which yield a jackpot in combination with a picture with which the center reel **12B** is supposed to stop.

In the following, a second embodiment of the present invention will be explained.

FIG. 5 is a side view showing a main part of the reel apparatus for a game machine in accordance with this embodiment.

While the reel apparatus **10** of this embodiment is similar to that of the first embodiment in terms of the configurations of three reels **12A**, **12B**, and **12C** and cover member **16**, they differ from each other in the configuration of the pivotal lever **18** and the method of driving and controlling the motor **20**.

Namely, while a pair of pivotal levers **18** are respectively disposed on both sides of the center reel **12B**, each pivotal lever **18** is made of a rigid resin member, and its pivotal axis **Ax2** is set on the same axis as the rotating axis **Ax1** of the reels **12A**, **12B**, and **12C**.

As in the case of the first embodiment, each pivotal lever **18** is driven by the motor **20** so as to pivot about the pivotal axis **Ax2**. Here, when the motor **20** drives and controls each pivotal lever **18** so as to move the cover member **16** from the shelter position indicated by chain double-dashed lines to the position of the display window **108a**, the cover member **16** is stopped at the latter position after being minutely vibrated there for a predetermined period of time.

In order to enable such driving control, one pivotal lever **18** of the pair of the pivotal levers **18** is provided with a protrusion **26** for detecting a pivotal angle position. This protrusion **26** and a photosensor (not depicted) detect that each pivotal lever **18** reaches the position indicated by solid lines. Based on the resulting detection signal, when each pivotal lever **18** pivots from the shelter position to the position of the display window **108a**, the motor **20** causes each pivotal lever **18** to pivot, as it is, to a position indicated by chain double-dashed lines (slightly below the position indicated by solid lines) and then, in the opposite direction, to a position indicated by chain double-dashed lines (slightly above the position indicated by solid lines). Then, after being reciprocated several times between the positions indicated by chain double-dashed lines, each pivotal lever **18** is stopped at the position indicated by solid lines.

Thus, also in this embodiment, the cover member **16** is stopped at the position indicated by solid line after being minutely vibrated. Accordingly, the picture **Fo'** formed in the cover member **16** appears in an unusual mode. As a result of this effect, the player's impression when winning a jackpot can be sufficiently enhanced, thereby allowing enjoyability to improve.

In particular, in this embodiment, since such an effect can be obtained by the driving control of the motor **20**, each pivotal lever **18** can be constituted by a rigid body alone, whereby its configuration can be simplified.

The reel apparatus for a game machine in accordance with the present invention comprises a plurality of reels which rotate around a single axis, each having a plurality of pictures formed in series on a peripheral surface thereof along a circumferential direction thereof, the reels being rotated independently from each other and automatically

stopped in sequence while each placing one of the plurality of pictures at a preset angle position. A cover member formed with a predetermined picture and movable between the preset angle position and a shelter position other than the preset angle position is disposed in front of the lastly stopping reel of the plurality of reels. When the lastly stopping reel is stopped so as to place a predetermined picture at the preset angle position, in the case where another reel is stopped so that a specific picture is placed at the preset angle position in combination with the predetermined picture, the cover member moves from the shelter position to the preset angle position and minutely vibrates at the preset angle position before being stopped. Accordingly, the predetermined picture formed in the cover member appears in an unusual mode, whereby the player's impression when winning a prize is fully enhanced, thus allowing enjoyability to improve.

What is claimed is:

1. A reel apparatus for a game machine, said reel apparatus comprising a plurality of reels which rotate around a single axis, each of said reels having a plurality of pictures formed in series on a peripheral surface thereof along a circumferential direction thereof, said reels being rotated independently from each other and automatically stopped in sequence while each placing one of said plurality of pictures at a preset angle position;

wherein a cover member formed with a predetermined picture and movable between said preset angle position and a shelter position other than said preset angle position is disposed in front of a lastly stopping reel of said plurality of reels; and

wherein, when said lastly stopping reel is stopped so as to place a predetermined picture at said preset angle position, in a case where another of said reels is stopped so that a specific picture is placed at said preset angle position in combination with said predetermined picture, said cover member moves from said shelter position to said preset angle position and minutely vibrates at said preset angle position before being stopped.

2. The reel apparatus according to claim 1, wherein said cover member is supported by a pivotal lever which is pivotally disposed around a predetermined pivotal axis; and a pivotal lever driving means for pivoting said pivotal lever such that said cover member can be placed at said preset angle position and said shelter position.

3. The reel apparatus according to claim 2, wherein a part of said pivotal lever is constituted by an elastic member which causes said cover member to minutely vibrate.

4. The reel apparatus according to claim 2, wherein said pivotal lever driving means drives and controls said pivotal lever so as to cause said cover member to minutely vibrate.

5. The reel apparatus according to claim 1, further comprising a light-emitting member within a space on an inner periphery side of said lastly stopping reel;

wherein said predetermined picture of said lastly stopping reel and said predetermined picture of said cover member are respectively formed with light-transmitting portions; and

wherein, when said lastly stopping reel is stopped so as to place said predetermined picture at said preset angle position while said cover member is stopped at said preset angle position, said light-emitting member and both of said light-transmitting portions are positioned on a single line.